PATENT ABSTRACTS OF JAPAN

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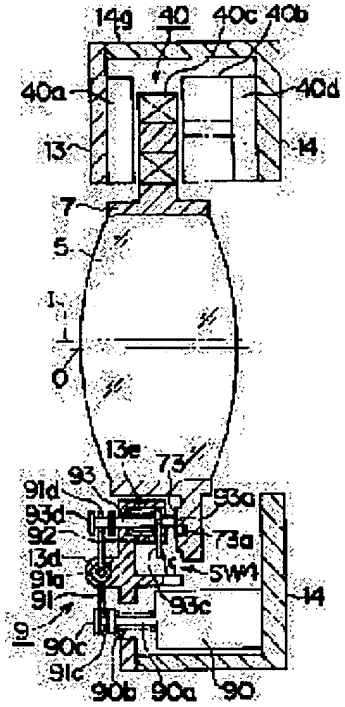
(71)Applicant : NIKON CORP
(72)Inventor : IMURA YOSHIO

(54) SHAKE CORRECTION DEVICE AND SHAKE CORRECTION CAMERA

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a shake correction device and a shake correction camera capable of being made compact and reducing power consumption.
SOLUTION: A lens frame 7 is provided with a smooth surface 73 and a recessed part 73a. A lock pin 93 is equipped with a smooth surface 93a at its tip and the smooth surface 73 slides in a state where it is brought into pressure-contact with the smooth surface 93a. When a latch solenoid 90 restores a plunger 90a, the plunger 90a is protruded by the energizing force of a coil spring 90b. As a result, a lever 91 is rotated, and the lock pin 93 is protruded toward the lens frame 7 by the energizing force of a coil spring 92. By driving the lens frame 7 by a motor 40 until the center O of a shake correction lens 5 is aligned with an optical axis I in a state where the smooth surfaces 93a and 73a are brought into pressure-contact with each other, the smooth surface 93a is fit in the smooth surface 73a and the lens 5 is locked by the lock pin 93.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The attachment component which holds amendment Bure amendment optical system and the aforementioned Bure amendment optical system for Bure, The driving force generating section which drives the aforementioned Bure amendment optical system, the holddown member which fixes the aforementioned attachment component, and the mechanical component which drives the aforementioned holddown member are included. the aforementioned attachment component The engaged section which engages with the engagement section of the aforementioned holddown member, and the aforementioned engagement section and the slide section in which contact movement is possible are included. the aforementioned mechanical component It is the Bure compensator carry out pressurization contact of the aforementioned engagement section and the aforementioned slide section, and carry out that are in the state carried out pressurization contact, drive the aforementioned Bure amendment optical system, and the aforementioned engagement section and the aforementioned slide section make the aforementioned engagement section and the aforementioned engaged section, as for the aforementioned driving force generating section, engaged as the feature.
[Claim 2] The attachment component which holds amendment Bure amendment optical system and the aforementioned Bure amendment optical system for Bure, The driving force generating section which drives the aforementioned Bure amendment optical system, the holddown member which fixes the aforementioned attachment component, and the mechanical component which drives the aforementioned holddown member are included. the aforementioned holddown member The engaged section which engages with the engagement section of the aforementioned attachment component, and the aforementioned engagement section and the slide section in which contact movement is possible are included. the aforementioned mechanical component It is the Bure compensator carry out pressurization contact of the aforementioned engagement section and the aforementioned slide section, and carry out that are in the state carried out pressurization contact, drive the aforementioned Bure amendment optical system, and the aforementioned engagement section and the aforementioned slide section make the aforementioned engagement section and the aforementioned engaged section, as for the aforementioned driving force generating section, engaged as the feature.
[Claim 3] It is the Bure compensator which the aforementioned driving force generating section drives the aforementioned Bure amendment optical system in the Bure compensator according to claim 1 or 2 in the direction which carries out an abbreviation rectangular cross to an optical axis, and the aforementioned mechanical component drives the aforementioned holddown member in the aforementioned optical-axis direction, and is carried out [that the aforementioned slide section is a slide side which carries out an abbreviation rectangular cross to the aforementioned optical axis, and] as the feature.
[Claim 4] the crevice into which the aforementioned slide side and contact are possible for the aforementioned engagement section, and it is the heights which have a flat side in a point in the Bure compensator according to claim 3, and, as for the aforementioned engaged section, the aforementioned heights get -- it is -- the configuration of the aforementioned heights -- the configuration of the aforementioned crevice, and abbreviation -- the Bure compensator characterized by the same thing
[Claim 5] It is the Bure compensator characterized by generating only the welding pressure to which the aforementioned mechanical component contacts the aforementioned engagement section and the aforementioned engaged section in the Bure compensator given in any 1 term from a claim 1 to a claim 4.
[Claim 6] The Bure amendment camera containing the Bure compensator given in any 1 term from a claim 1 to a claim 5, the Bure detecting element which detects Bure and outputs the Bure detecting signal, and the control section which carries out drive control of the aforementioned driving force generating section based on the aforementioned Bure detecting signal.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates Bure by blurring in a camera etc. to an amendment Bure compensator and the Bure amendment camera.
[0002]
[Description of the Prior Art] The lens frame with which JP,4-34514,A holds the Bure correcting lens and this Bure correcting lens, The holddown member which changes between a fixed position and a fixed release position, and fixes and cancels [fixed] this lens frame, The Bure compensator equipped with the extension spring which energizes this holddown member towards a fixed position from a fixed release position, and the lock member which engages and cancels [engagement] with this holddown member, and locks and cancels [lock] a holddown member in a fixed release position is indicated to the view 5 - the view 7. This Bure compensator fixes and cancels [fixed] a lens frame by engaging and engagement canceling the slot formed in the periphery section of a holddown member, and the claw part formed in the lock member.
[0003] JP,6-67274,A is indicating the Bure compensator equipped with the pin which has the Bure correcting lens, the lens frame holding this Bure correcting lens, the crevice of the shape of a taper formed in this lens frame, and the heights of the shape of a taper which engages with this crevice, the coiled spring which energizes these heights in the direction which engages with a crevice, and the plunger type latch solenoid which drives these heights and cancels engagement to a crevice to drawing 2 and drawing 3 . Even if the center of this Bure compensator of heights and a crevice does not correspond, according to the energization force of coiled spring, it inserts heights in a crevice and is fixing the lens frame.
[0004]
[Problem(s) to be Solved by the Invention] The Bure compensator of JP,4-34514,A is equipped with the motor which resists the energization force of an extension spring and drives a holddown member while it cancels engagement to a holddown member and a lock member in a fixed release position. Since the energization force of an extension spring was resisted and a holddown member was driven from a fixed position to a fixed release position, this motor had the problem that excessive electrical energy was required.
[0005] Even if the position of heights and a crevice had shifted, according to the taper side formed in heights and the crevice, the Bure compensator of JP,6-67274,A guided the lens frame, and was fixing the lens frame by the pin in the predetermined fixed position. For this reason, this pin had the problem that a stroke will need to be long and a lock mechanism will be enlarged. Moreover, since this Bure compensator was locked making a lens frame drive even if the position of heights and a crevice has shifted, it had to make the energization force of coiled spring big. Consequently, since it was necessary to resist the energization force of this coiled spring and to drive a pin, there was a problem that the power consumption of a plunger type latch solenoid will become large.
[0006] The technical problem of this invention is compact and is offering the Bure compensator and the Bure amendment camera which can lessen power consumption.
[0007]
[Means for Solving the Problem] this invention solves the aforementioned technical problem by the following solution meanses. In addition, although the sign corresponding to the gestalt of operation of this invention is attached and explained in order to make an understanding easy, it does not limit to this. Invention of a claim 1 Bure Namely, amendment Bure amendment optical system (5), The attachment component (7) holding the aforementioned Bure amendment optical system, and the driving force generating section which drives the aforementioned Bure amendment optical system (40 41), The holddown member (93) which fixes the aforementioned attachment component, and the mechanical component (92) which drives the aforementioned holddown member are included. the aforementioned

attachment component The engaged section (73a) which engages with the engagement section (93a) of the aforementioned holddown member, and the aforementioned engagement section and the slide section (73) in which contact movement is possible are included. the aforementioned mechanical component Pressurization contact (S1202) of the aforementioned engagement section and the aforementioned slide section is carried out. the aforementioned driving force generating section The aforementioned engagement section and the aforementioned slide section are in the state which carried out pressurization contact, and are the Bure compensator characterized by driving the aforementioned Bure amendment optical system (S1203), and making the aforementioned engagement section and the aforementioned engaged section engaged (S1204).

[0008] The attachment component to which invention of a claim 2 holds amendment Bure amendment optical system (5) and the aforementioned Bure amendment optical system for Bure (7), The driving force generating section (40 41) which drives the aforementioned Bure amendment optical system, and the holddown member (93) which fixes the aforementioned attachment component and the mechanical component (92) which drives the aforementioned holddown member are included. the aforementioned holddown member The engaged section (930a) which engages with the engagement section (730a) of the aforementioned attachment component, and the aforementioned engagement section and the slide section (930) in which contact movement is possible are included. the aforementioned mechanical component Pressurization contact (S1202) of the aforementioned engagement section and the aforementioned slide section is carried out. the aforementioned driving force generating section The aforementioned engagement section and the aforementioned slide section are in the state which carried out pressurization contact, and are the Bure compensator characterized by driving the aforementioned Bure amendment optical system (S1203), and making the aforementioned engagement section and the aforementioned engaged section engaged (S1204).

[0009] The aforementioned Bure amendment optical system is driven in the direction in which the aforementioned driving force generating section carries out the abbreviation rectangular cross of the invention of a claim 3 to an optical axis (I) in the Bure compensator according to claim 1 or 2, the aforementioned mechanical component drives the aforementioned holddown member in the aforementioned optical-axis direction, and the aforementioned slide section is the Bure compensator carry out that it is the slide side (73; 930) which carries out an abbreviation rectangular cross to the aforementioned optical axis as the feature.

[0010] the crevice (73a;930a) into which invention of a claim 4 is heights (93a;730a) to which the aforementioned slide side and contact are possible for the aforementioned engagement section, and it has a flat side in a point in the Bure compensator according to claim 3, and, as for the aforementioned engaged section, the aforementioned heights get -- it is -- the configuration of the aforementioned heights -- the configuration of the aforementioned crevice, and abbreviation -- it is the Bure compensator characterized by the same thing

[0011] Invention of a claim 5 is the Bure compensator characterized by the aforementioned mechanical component generating only the welding pressure to which the aforementioned engagement section and the aforementioned engaged section are contacted in the Bure compensator given in any 1 term from a claim 1 to a claim 4.

[0012] Invention of a claim 6 is the Bure amendment camera (20 30) containing the Bure compensator given in any 1 term from a claim 1 to a claim 5, and the Bure detecting element (31) which detects Bure and outputs the Bure detecting signal and the control section (4) which carries out drive control (S909, S914) of the aforementioned driving force generating section based on the aforementioned Bure detecting signal.

[0013]

[Embodiments of the Invention] (The 1st operation gestalt) With reference to a drawing etc., the operation gestalt of this invention is explained in more detail hereafter. First, the case where the Bure compensator concerning the 1st operation gestalt of this invention is applied to a single-lens reflex camera is mentioned as an example, and is explained, and the outline of this Bure compensator is explained. Drawing 1 is the block diagram of a single-lens reflex camera which carried the Bure compensator concerning the 1st operation gestalt of this invention.

[0014] (Interchangeable lens) The interchangeable lens 20 is equipped with the angular-velocity sensors 1 and 2, the sensor circuit 3, the lens side CPU 4 and voice coil motors (henceforth VCM) 40 and 41, the Bure correcting lens 5, position sensors 42 and 43, the latch solenoid 90, the Bure mode setting switch SW3, and the lock state pilot switch SW4. The interchangeable lens 20 is attached in the camera body 30 free [attachment and detachment], and can be exchanged for it.

[0015] The angular-velocity sensors 1 and 2 are sensors which detect vibration produced to a camera. The angular-velocity sensor 1 is an angular-velocity sensor for pitching detection which detects the angular velocity of the circumference of a x axis, and the angular-velocity sensor 2 is an angular-velocity sensor for yawing detection which detects the angular velocity of the circumference of the y-axis. The angular-velocity sensors 1 and 2 output the angular-velocity signal (Bure detecting signal) according to the angular velocity detected, respectively to the sensor circuit 3.

[0016] The sensor circuit 3 is a circuit which carries out predetermined processing about the angular-velocity signal

which the angular-velocity sensors 1 and 2 output. The sensor circuit 3 consists of a filter which removes a predetermined frequency component from the angular-velocity signal which the angular-velocity sensors 1 and 2 output, amplifier which amplifies the output signal of this filter.

[0017] The lens side CPU 4 is the central-process section for carrying out the Bure amendment control. The lens side CPU 4 calculates the Bure speed and the amount of Bure amendments based on an output signal, focal distance information, photography distance information, etc. on the sensor circuit 3. The lens side CPU 4 calculates the difference of the position detecting signal which position sensors 42 and 43 output, and the target activation point signal according to the Bure speed and the amount of Bure amendments, and outputs the driving signal for carrying out drive control of the Bure correcting lens 7 to VCM 40 and 41, respectively. The body side CPU 31 and communication are possible for the lens side CPU 4 through signal lines SL1 and SL2.

[0018] VCM 40 and 41 is a motor for driving the Bure correcting lens 5. VCM40 is a motor for driving the Bure correcting lens 5 to y shaft orientations, and VCM41 is a motor for driving the Bure correcting lens 5 in the direction of a x axis. VCM 40 and 41 will generate electromagnetic force in the direction of a x axis, and y shaft orientations, respectively, if drive current (driving signal) flows in a coil.

[0019] The Bure correcting lens 5 constitutes some photography optical system [at least], changes a photography optical path, and is an amendment lens about Bure. The Bure correcting lens 5 is driven in the direction which carries out an abbreviation rectangular cross to an optical axis, and amends Bure.

[0020] Position sensors 42 and 43 are sensors which detect the position of the Bure correcting lens 5. A position sensor 42 detects the position of y shaft orientations of the Bure correcting lens 7, and a position sensor 43 detects the position of the direction of a x axis of the Bure correcting lens 7. Position sensors 8 and 9 feed back the position detecting signal about the position of the Bure correcting lens 5 to the lens side CPU 4.

[0021] The latch solenoid 90 is a member for locking and lock canceling the Bure correcting lens 5. The latch solenoid 90 is a well-known plunger type latch solenoid etc., for example.

[0022] The Bure mode setting switch SW3 is a switch for setting up whether it is an amendment for Bure. The Bure mode setting switch SW3 can be changed between the 2nd mode which does not amend the 1st mode of an amendment, and Bure for Bure.

[0023] The lock state pilot switch SW4 is a switch which detects the lock state and lock release state of the Bure correcting lens 5. The lock state pilot switch SW4 carries out ON operation, when the Bure correcting lens 5 is in a lock state, and when the Bure correcting lens 5 is in a lock release state, it carries out OFF operation.

[0024] (Camera body) The camera body 30 is equipped with the photometry section 32 which measures a photographic subject's luminosity, the ranging section 33 which measures the distance to a photographic subject, the focal distance reading section 34, the photography distance reading section 35, the shutter section 36, a converging section 37, the AF mechanical component 38, the film mechanical component 39, the half-push switch SW1, and all the push switches SW2 the body side CPU 31.

[0025] The body side CPU 31 is the central-process section for carrying out various control by the side of the camera body 30. The body side CPU 31 performs various control for photography. The body side CPU 31 generates the Bure amendment stop signal for stopping the Bure amendment start signal for starting the Bure amendment at the time of ON operation of the Bure amendment start signal for starting the Bure amendment at the time of ON operation of the half-push switch SW1 (working [push a half and]), and all the push switches SW2 (under exposure), and the Bure amendment etc.

[0026] The focal distance reading section 34 detects and reads the focal distance of photography optical system. The focal distance reading section 34 detects and reads a focal distance from the position of the zoom ring which a photography person operates and which is not illustrated, and the position in the direction of an optical axis of zoom optical system, in order to move the zoom optical system which is not illustrated in the direction of an optical axis, for example. The focal distance reading section 34 transmits the read focal distance information to the body side CPU 31.

[0027] The photography distance reading section 35 detects and reads photography distance. The focal distance reading section 35 detects and reads the distance from the film plane which is not illustrated to a photographic subject based on the activation result of AF mechanical component. The photography distance reading section 35 transmits the read photography distance information to the body side CPU 31.

[0028] The shutter section 36 opens and closes the path of the incident ray to the film plane which is not illustrated, or carries out time exposure. The shutter section 36 consists of a mirror mechanical component which drives the mirror which is not illustrated, a shutter control section which carries out drive control of this mirror mechanical component. The shutter section 36 performs shutter operation based on the time of the set-up shutter second (shutter speed, exposure time).

[0029] A converging section 37 restricts a bundle of rays, the quantity of light, etc. which penetrated photography

optical system. A converging section 37 consists of the drawing mechanism section which carries out adjustable [of the aperture] to the shape of the said heart continuously, a drawing mechanical component which drives this drawing mechanism section.
[0030] The AF mechanical component 38 carries out a focus based on the ranging result of the ranging section 33. The AF mechanical component 38 consists of an AF control circuit which carries out drive control of AF motor and this AF motor for driving the focal optical system which constitutes some photography optical system [at least] in the direction of an optical axis.
[0031] The film mechanical component 39 carries out winding up and rewinding. [which it does not illustrate] [of a film] The film mechanical component 39 consists a film of a control circuit which carries out drive control in winding up and the motor for rewinding, and this motor.
[0032] The half-push switch SW1 is a switch for starting a series of photography housekeeping operation. The half-push switch SW1 is interlocked with half-push operation of the release button which is not illustrated, and carries out ON operation.
[0033] All the push switches SW2 are switches for starting photography operation of exposure operation etc. All the push switches SW2 are interlocked with all push operation of a release button, and carry out ON operation.
[0034] Signal-line SL1 is for transmitting the various information about photography on focal distance information, photography distance information, etc. to the lens side CPU 4 from the body side CPU 31.
[0035] Signal-line SL2 is for transmitting the signal about the Bure amendment control to the lens side CPU 4 from the body side CPU 31. Signal-line SL2 transmits the Bure amendment start signal, the Bure amendment stop signal, etc.
[0036] (Bure compensator) Drawing 2 is the cross section showing the Bure compensator concerning the 1st operation gestalt of this invention. Drawing 3 is the cross section showing the state where the III-IIIA line of drawing 2 cut. Drawing 4 is the cross section showing the state where the IV-IV line of drawing 2 cut. Drawing 5 is the cross section showing the state where the V-VA line of drawing 2 cut. In addition, the number of the member in the cross section cut by the III-IIIB line of drawing 2 attaches and shows a parenthesis in drawing 3 . Moreover, the number of the member in the cross section cut by the V-VB line of drawing 2 attaches and shows a parenthesis in drawing 5 .
[0037] The Bure correcting lens 5 moves in the direction which carries out an abbreviation rectangular cross to an optical axis I, and is an amendment lens about Bure. The Bure correcting lens 5 is being inserted in and fixed to the inner circumference section of the lens frame 7 as shown in drawing 2 - drawing 5 .
[0038] The lens frame 7 is a member holding the Bure correcting lens 5. the slit arranged in a flat surface perpendicular to an optical axis I as the lens frame 7 is shown in drawing 2 and drawing 5 -- it is indicated in drawing 3 and drawing 4 as Members 42b and 43b -- as -- a shot -- the inclusion sections 10 and 11 side and 12 sides -- a shot -- a receptacle -- as it is indicated in drawing 3 and drawing 5 as members 70, 71, and 72, the coils 40c and 41c of VCM 40 and 41 are attached As shown in drawing 3 and drawing 4 , the spring-peg sections 7a, 7b, and 7c and the hook sections 7g and 7h project, and are formed in the periphery section of the lens frame 7. Moreover, the lens frame 7 equips the locking device 9 and the front face of the side which counters with the smooth side 73, as shown in drawing 2 .
[0039] a shot -- a receptacle -- members 70, 71, and 72 are members for guiding free [movement of this lens frame 7], when the lens frame 7 moves in the direction which carries out an abbreviation rectangular cross to an optical axis I a shot -- a receptacle -- members 70, 71, and 72 touch the shots 10a, 11a, and 12a for moving the lens frame 7 smoothly, as shown in drawing 3 and drawing 4 a shot -- a receptacle -- members 70, 71, and 72 consist of a metal with a high degree of hardness rather than Shots 10a, 11a, and 12a a shot -- a receptacle -- members 70, 71, and 72 -- a shot -- it is desirable to form the front face in a plane so that field contact may be carried out with the end faces 10b, 11b, and 12b of the inclusion sections 10, 11, and 12
[0040] springs 60, 61, and 62 -- the base -- the energization for carrying out pressurization contact of Shots 10a, 11a, and 12a and the lens frame 7, while supporting the lens frame 7 free [movement] to a member 14 -- it is a member As shown in drawing 3 and drawing 4 , springs 60, 61, and 62 have attached the edge in the spring-peg sections 7a, 7b, and 7c, respectively, and have attached the edge of an opposite side in the spring-peg sections 14a, 14b, and 14c, respectively. the operation gestalt of this invention -- the sum total of the energization force of springs 60, 61, and 62 -- the Bure correcting lens 5, the lens frame 7, Coils 40c and 41c, and a shot -- a receptacle -- it is desirable to set it as 1.5W-5W 1.5 to 5 times as many as this to the total weight (hereafter referred to as W) of members 70, 71, and 72 and the slit boards 42b and 43b
[0041] the base -- a member 14 -- a shot -- it is a holddown member for attaching the inclusion sections 10, 11, and 12, bearing 15, etc. the base -- as shown in drawing 3 and drawing 4 , the spring-peg sections 14a, 14b, and 14c are formed in the member 14 the base -- it is shown in the periphery section of a member 14 at drawing 3 - drawing 5 -- as -- protection -- 14g of flanges for attaching a member 13 is formed the base -- a member 14 is shown in drawing 3 - drawing 5 -- as -- a shot -- the inclusion sections 10, 11, and 12, the bearing 15 of a couple, the yokes 40d and 41d of

VCM 40 and 41, the photo detectors 42d and 43d of position sensors 42 and 43, and the latch solenoid 90 of the locking device 9 shown in drawing 2 are attached
[0042] protection -- a member 13 -- drives, such as VCM 40 and 41, -- the base -- casing protected with a member 700 -- it is a member protection -- the member 13 has attached the lens frame receptacle sections 13a, 13b, and 13c in the field by the side of the lens frame 7, as are shown in drawing 3 and drawing 5 , and it is indicated in drawing 3 and drawing 4 as the yokes 40a and 41a of VCM 40 and 41, and the light emitting devices 42a and 43a of position sensors 42 and 43 moreover, protection -- the member 13 is supported free [rotation of the lever 91 shown in drawing 2]
[0043] In drawing 3 and drawing 4 , the lens frame receptacle sections 13a, 13b, and 13c are portions which regulate the travel of the lens frame 7 to predetermined within the limits while catching this lens frame 7, when the lens frame 7 moves leftward in drawing. Focusing on the optical axis I, the lens frame receptacle sections 13a, 13b, and 13c open an interval 120 degrees, and are arranged. As for the lens frame receptacle sections 13a, 13b, and 13c, it is desirable to form the front face in a plane so that field contact may be carried out with the lens frame 7. moreover, the distance of the lens frame receptacle sections 13a, 13b, and 13c and the lens frame 7 -- a shot -- a receptacle -- the time of members 70, 71, and 72 and end faces 10a, 11a, and 12a estranging relatively -- a shot -- it is desirable to set it as the size which is the grade in which Shots 10a, 11a, and 12a are not omitted from Stowages 10c, 11c, and 12c
[0044] The guide shaft 9 is a member for preventing that the Bure correcting lens 5 rotates to the circumference of an optical axis I while guiding it in the direction which carries out an abbreviation rectangular cross to an optical axis I free [movement of the lens frame 7]. The guide shaft 9 arranges which direction of the direction of a x axis, and y shaft orientations in the direction (the direction of C in drawing) which crosses at an angle of predetermined [other than a right angle], as shown in drawing 2 . The guide shaft 9 is inserted in these hook sections 7g and 7h so that the hook sections 7g and 7h of the lens frame 7 can move in the direction of C in drawing.
[0045] The guide arm 8 is a member for carrying out the parallel displacement of the lens frame 7 to the guide direction (the direction of C in drawing) of the guide shaft 9. Bearings 8g and 8h are formed in the both ends, and the guide arm 8 is inserted in 8h free [rotation of the guide shaft 9] 8g of this bearing, as shown in drawing 2 . the guide arm 8 is shown in drawing 4 -- as -- the base -- shaft 8a is formed in the edge by the side of a member 14, and shaft 8a is inserted in bearing 15 free [rotation] consequently, the guide arm 8 can be rotated in the direction of the arrow in drawing -- as -- the base -- it is supported by the member 14 When this guide arm 8 rotates, the lens frame 7 is movable in the guide direction (the direction of C in drawing) of the guide shaft 9, and the direction (the direction of D in drawing) which intersects perpendicularly. In addition, although the guide arm 8 has inserted shaft 8a of a couple in the bearing 15 of a couple, respectively, it is omitting illustration about one shaft 8a and bearing 15 in drawing 4 .
[0046] VCM 40 and 41 is a motor for driving the Bure correcting lens 5 in the direction which carries out an abbreviation rectangular cross to an optical axis I. VCM40 is a motor which generates electromagnetic force Py in y shaft orientations, and drives the lens frame 7 to y shaft orientations, as shown in drawing 2 . VCM41 is a motor which generates electromagnetic force Px in the direction of a x axis, and drives the lens frame 7 in the direction of a x axis. Except that the directions of the electromagnetic force which acts on the lens frame 7 differ, VCM 40 and 41 is the same structure and, below, explains VCM40. VCM40 is shown in drawing 3 -- as -- protection -- with yoke 40a attached in the field by the side of the lens frame 7 of a member 13 Coil 40c which has been arranged between permanent magnet 40b which forms a magnetic field between this yoke 40a, and yoke 40a and permanent magnet 40b, and was attached in the lens frame 7, the base -- it is attached in the field by the side of the lens frame 7 of a member 14, and consists of yoke 40d which fixes permanent magnet 40b VCM40 will generate the electromagnetic force Py which drives the Bure correcting lens 5 to an opposite direction (upper part), if the electromagnetic force Py which will drive the Bure correcting lens 5 caudad in accordance with y shaft orientations shown in drawing 2 if current flows to coil 40c is generated and the current of an opposite direction flows to coil 40c.
[0047] Position sensors 42 and 43 are the sensors for detecting the position of the Bure correcting lens 5. A position sensor 42 is a sensor which detects the position of y shaft orientations of the Bure correcting lens 5, and a position sensor 43 is a sensor which detects the position of the direction of a x axis of the Bure correcting lens 5. As shown in drawing 2 , the position detection sensors 42 and 43 avoid the guide shaft 9 in VCM 40 and 41 and the position which counters, and are arranged in it, respectively. Position sensors 42 and 43 are all the same structures, and, below, explain a position sensor 42.
[0048] a position sensor 42 is shown in drawing 5 -- as -- protection -- light-emitting-device (Light Emitting Diode) 42a attached in the field by the side of the lens frame 7 of a member 13, and the base -- the slit arranged between 42d (PSD) of photo detectors attached in the field by the side of the lens frame 7 of a member 14, and light-emitting-device 42a and 42d of photo detectors -- a member -- 42b and this slit -- a member -- it consists of slit 42c formed in 42b The light which carried out outgoing radiation from light-emitting-device 42a passes slit 42c, and reaches 42d of photo detectors. a slit -- a member -- movement of 42b also moves the position (optical spot) of light which passes slit 42c

and reaches 42d of photo detectors If the position of light changes, in order that the output signal of 42d of photo detectors may change, the position of y shaft orientations of the Bure correcting lens 5 is detectable based on change of this output signal.

[0049] a shot -- the inclusion sections 10, 11, and 12 are the portions holding Shots 10a, 11a, and 12a etc. a shot -- the inclusion sections 10, 11, and 12 are shown in drawing 3 and drawing 4 -- as -- the same structure -- it is -- the following -- a shot -- it explains focusing on the inclusion section 10 a shot -- the inclusion section 10 is shown in drawing 4 -- as -- the base -- it is projected and attached in the field by the side of the lens frame 7 of a member 14 toward this lens frame 7 a shot -- the inclusion section 10 -- a shot -- 10a, end-face 10b, and a shot -- stowage 10c, and 10d of compression spring stowages and a shot -- a receptacle -- a member -- it consists of 10e and 10f of compression spring, and screw 10g

[0050] the guide for Shots 10a, 11a, and 12a moving the lens frame 7 in the direction which carries out an abbreviation rectangular cross to an optical axis I smoothly, and showing around -- it is a member As shown in drawing 2 , focusing on the optical axis I, Shots 10a, 11a, and 12a open an interval 120 degrees, and are arranged.

[0051] the guide whose end-face 10b catches the lens frame 7 -- it is a member When the lens frame 7 moves leftward which is shown in drawing 4 , end-face 10b contacts this lens frame 7, and catches. end-face 10b -- a shot -- a receptacle -- it is desirable to form the front face in a plane so that field contact may be carried out with a member 70

[0052] a shot -- stowage 10c -- the shot from end-face 10b -- 10a -- small -- a protrusion -- the bottom -- a state -- it is -- this shot -- it is the portion which contains 10a a shot -- stowage 10c -- the shot of 10d of compression spring stowages -- a receptacle -- a member -- it is formed in from the base by the side of 10e before end-face 10b a shot -- since the bore of stowage 10c is smaller than the bore which is 10d of compression spring stowages -- the energization force of 10f of compression spring -- the shot out of 10d of compression spring stowages -- a receptacle -- a member -- 10e does not jump out

[0053] 10d of compression spring stowages -- a shot -- a receptacle -- a member -- 10e and this shot -- a receptacle -- a member -- it is the portion which contains 10f of compression spring which turns 10e to the lens frame 7 side, and energizes it 10h of female screw sections which gear with screw 10g is formed in 10d of compression spring stowages. 10d of compression spring stowages -- a shot -- a receptacle -- inserting member 10e and 10f of compression spring in the interior of 10h shell of female screw sections, and thrusting screw 10g into 10h of female screw sections -- a shot -- a receptacle -- member 10e and 10f of compression spring are fixed

[0054] a shot -- a receptacle -- a member -- 10e -- a shot -- the state where pressurization contact was carried out with 10a -- this shot -- the guide which catches 10a -- it is a member a shot -- a receptacle -- a member -- 10e -- a shot -- 10a -- from a metal with a high degree of hardness -- becoming -- a shot -- it is desirable to form the front face in a plane so that a point contact may be carried out to 10a

[0055] 10f of compression spring -- the lens frame 7 side -- turning -- a shot -- a receptacle -- a member -- it is the member which energizes 10e As for the sum total of the compression spring [10f, 11f, and 12f] energization force, with the operation gestalt of this invention, it is desirable to set up to the sum total of the energization force of springs 60, 61, and 62 more than double precision. For example, when the sum total of the energization force of springs 60, 61, and 62 is 1.5W, as for the sum total of the compression spring [10f 11f, and 12f] energization force, it is desirable to set up more than 3W. Consequently, no matter the Bure correcting lens 5 may be what posture, the Bure correcting lens 5 can be supported in the position shown in drawing 2 - drawing 5 .

[0056] (Locking device) Drawing 6 is the cross section showing the state where the locking device in the Bure compensator concerning the 1st operation gestalt of this invention locked the lens frame. Drawing 7 is the cross section showing the state where the locking device in the Bure compensator concerning the 1st operation gestalt of this invention carried out lock release of the lens frame. Drawing 8 is the cross section showing the state where the smooth side of the locking device in the Bure compensator concerning the 1st operation gestalt of this invention contacted the smooth side of a lens frame.

[0057] A locking device 9 is equipment for locking and lock canceling the lens frame 7. The locking device 9 is equipped with the latch solenoid 90, a lever 91, coiled spring 92, the lock pin 93, etc.

[0058] The latch solenoid 90 is a member which changes the lens frame 7 to a lock state and a lock release state by energizing. It has flange 90c formed leftward in drawing at energization coiled spring 90b and the nose of cam of plunger 90a in plunger 90a to which the latch solenoid 90 can move freely in the direction of A in drawing, and this plunger 90a. the latch solenoid 90 -- the base -- it is attached in the field by the side of the lens frame 7 of a member 14

[0059] A lever 91 is a member for locking and lock canceling the lens frame 7. A lever 91 is a member for transmitting the drive of plunger 90a to a lock pin 93. a lever 91 is formed in the center of abbreviation -- having -- protection -- it was formed in shaft 91a supported free [rotation] by 13d of bearings of a member 13, hook section 91c which was

formed in the edge and hung on flange 90c, and the edge of an opposite side, and has 91d of hook sections hung on 93d of flanges of a lock pin 93
[0060] the spring receptacle attached behind smooth side 93a by which the lock pin 93 was formed in the edge (point), and this smooth side 93a -- a member -- it has 93d of flanges formed in the edge of 93c and the opposite side of a lock pin 93 a lock pin 93 -- protection -- the member 93 is penetrated and it can move in the direction parallel to an optical axis I -- as -- this protection -- it fits into a member 93 A lock pin 93 can be interlocked with operation of plunger 90a, and can move freely to the lens frame 7.
[0061] Smooth side 93a is crevice 73a which carried out pressurization contact with this smooth side 73, and was formed in the center of abbreviation of the smooth side 73, and a portion which fits in so that the smooth side 73 formed in the direction which carries out an abbreviation rectangular cross to an optical axis I can be slid. Smooth side 93a is formed in parallel with the smooth side 73, and it is formed in the abbreviation perpendicular to the optical axis I so that it may become parallel to the driving direction of the Bure correcting lens 5 and the lens frame 7. smooth side 93a -- crevice 73a -- inserting in -- ****** -- easy -- as -- the cross-section configuration -- the cross-section configuration of crevice 73a, and abbreviation -- it is desirable to make it the same Smooth side 93a and crevice 73a have a configuration more desirable than the shape of a taper toward which the both-sides side symmetrical with these center lines inclined, and the configuration where a part of side inclined which is parallel to this center line, as shown in drawing 6 - drawing 8 .
[0062] Coiled spring 92 is a member which energizes a lock pin 93 rightward in drawing. coiled spring 92 -- protection -- it is contained in coiled spring stowage 13e formed in the member 14 Smooth side 93a carries out pressurization contact with the smooth side 73, and coiled spring 92 generates the energization force which moves smooth side 93a into crevice 73a from on the smooth side 73.
[0063] Below, operation of the Bure compensator concerning the 1st operation gestalt of this invention is explained. Drawing 9 is a flow chart for explaining operation of the Bure compensator concerning the 1st operation gestalt of this invention. Drawing 10 is a flow chart following drawing 9 . In addition, if the main switch which is not illustrated carries out ON operation, the body side CPU 31 will start this flow, and will supply a power supply to the lens side CPU 4.
[0064] In Step (hereafter referred to as S) 901, it judges whether the half-push switch SW1 carried out ON operation of the body side CPU 31. When the half-push switch SW1 carries out ON operation, it progresses to S902, and when the half-push switch SW1 does not carry out ON operation, the body side CPU 31 repeats judgment until the half-push switch SW1 carries out ON operation.
[0065] In S902, it judges whether the Bure mode setting switch SW3 carried out ON operation of the body side CPU 31. When the Bure mode setting switch SW3 carries out ON operation, it progresses to S903, and when the Bure mode setting switch SW3 does not carry out ON operation, it progresses to S904.
[0066] In S903, the body side CPU 31 directs the Bure detection start to the lens side CPU 4. The body side CPU 31 transmits the Bure detection start signal to the lens side CPU 4 through signal-line SL2. Pointing to the lens side CPU 4 based on this Bure detection start signal to the power circuit which does not illustrate supply of the power supply to the angular-velocity sensors 1 and 2, the angular-velocity sensors 1 and 2 start the detection of vibration which joins a camera.
[0067] In S904, the body side CPU 31 directs a photometry in the photometry section 32. The photometry section 32 measures a photographic subject's luminosity, in order to determine the time of a shutter second, and a drawing value.
[0068] In S905, the body side CPU 31 directs ranging in the ranging section 33. The ranging section 33 measures the distance to a photographic subject, in order to carry out focus control.
[0069] In S906, the body side CPU 31 directs AF drive to the AF mechanical component 38. The AF mechanical component 38 carries out drive control of the focal optical system which is not illustrated by AF control circuit according to the ranging result of the ranging section 33, and focal optical system carries out a focus.
[0070] In S907, it judges whether the Bure mode setting switch SW3 is carrying out ON operation of the body side CPU 31. While the Bure mode setting switch SW3 is maintaining ON operation, it progresses to S908, and when the Bure mode setting switch SW3 has not carried out ON operation, it progresses to S919.
[0071] In S908, the body side CPU 31 directs lock release to the lens side CPU 4. The body side CPU 31 transmits a lock release start signal to the lens side CPU 4 through signal-line SL2, in order to cancel the lock state of the Bure correcting lens 5.
[0072] In S909, the body side CPU 31 directs the Bure amendment start to the lens side CPU 4. the body side CPU 31 -- half-push -- being working (inside of photography housekeeping operation) -- an amendment Bure amendment start signal is transmitted for Bure to the lens side CPU 4 through signal-line SL2 Moreover, the body side CPU 31 transmits the photography distance information which the focal distance information and the photography distance

reading section 35 which the focal distance reading section 34 read read to the lens side CPU 4 through signal-line SL1. The lens side CPU 4 reads focal distance information and photography distance information, and calculates the amount of Bure amendments based on the angular-velocity signal which these information and angular-velocity sensors 1 and 2 detected. The lens side CPU 4 calculates the target-position information according to this amount of Bure amendments, and carries out drive control of VCM 40 and 41 based on this target-position information.

[0073] In the state which shows in drawing 2 , since the hook sections 7g and 7h are hung on the guide shaft 9, as for the lens frame 7, rotation of the circumference of an optical axis I is regulated. For this reason, if VCM40 generates the downward electromagnetic force Py in accordance with y shaft orientations, as for the lens frame 7, the lower right will move the guide shaft 9 top to **. Consequently, the guide arm 8 shown in drawing 4 is counterclockwise rotated focusing on shaft 8a. If the guide arm 8 rotates, the parallel displacement of the guide shaft 9 shown in drawing 2 will be carried out in the direction (the direction of D in drawing) which intersects perpendicularly with the longitudinal direction. As for the lens frame 7, movement of the direction of optical-axis I is regulated with Shots 10a, 11a, and 12a. For this reason, the lens frame 7 moves with the Bure correcting lens 5 to an optical axis I in the inside of a perpendicular flat surface (inside of xy flat surface), and the Bure correcting lens 5 amends Bure. On the other hand, if VCM41 generates the leftward electromagnetic force Px along the direction of a x axis in the state which shows in drawing 2 , the lens frame 7 will move the guide shaft 9 top to a left riser, and will carry out the parallel displacement of the guide shaft 9 in the direction (the direction of D in drawing) which intersects perpendicularly with the longitudinal direction. Thus, the lens frame 7 is movable in arbitrary positions into a flat surface perpendicular to an optical axis I (inside of xy flat surface).

[0074] As shown in drawing 4 , the hook sections 7g and 7h are hung on the guide shaft 9 so that it can move in the direction of optical-axis I slightly. For this reason, in the state which shows in drawing 3 and drawing 4 , if rightward impulse force acts on the lens frame 7, this lens frame 7 will start movement rightward. consequently, a shot -- a receptacle -- members 10e, 11e, 12e, 70, 71, and 72 concentrate and receive impulse force in the contact section with Shots 10a, 11a, and 12a a shot -- a receptacle -- members 70, 71, and 72 -- Shots 10a, 11a, and 12a and a shot -- a receptacle -- compression spring 10f, 11f, and 12f is sagged, pushing Members 10e, 11e, and 12e rightward compression spring 10f, 11f, and 12f -- impulse force -- absorbing -- a shot -- a receptacle -- the impulse force in the contact section of members 10e, 11e, 12e, 70, 71, and 72 and Shots 10a, 11a, and 12a is eased Consequently, an impression (indentation) does not have formation ** in these contact sections.

[0075] if the impulse force exceeding the set point acts on the lens frame 7 -- end faces 10b, 11b, and 12b -- a shot -- a receptacle -- members 70, 71, and 72 are contacted and the lens frame 7 stops movement a shot -- a receptacle -- in order that members 70, 71, and 72 and end faces 10b, 11b, and 12b may carry out field contact -- the contact section -- becoming depressed (indentation) -- it does not form

[0076] In the state which shows in drawing 3 and drawing 4 , if leftward impulse force acts on the lens frame 7, the lens frame 7 will resist the energization force of springs 60, 61, and 62, and will move leftward. consequently, a shot -- a receptacle -- members 70, 71, and 72 and a shot -- a receptacle -- Members 10e, 11e, and 12e move in the direction estranged mutually Although springs 60, 61, and 62 absorb this impulse force when impulse force is small, when impulse force is large, the lens frame receptacle sections 13a, 13b, and 13c contact the lens frame 7, and the lens frame 7 stops movement. in order that the lens frame 7 may contact the lens frame receptacle sections 13a, 13b, and 13c -- Shots 10a, 11a, and 12a -- a shot -- it does not drop out of Stowages 10c, 11c, and 12c

[0077] In S910 shown in drawing 9 , it judges whether the half-push switch SW1 is carrying out ON operation of the body side CPU 31. While the half-push switch SW1 is maintaining ON operation, it progresses to S911, and when the half-push switch SW1 has not carried out ON operation, it progresses to S922.

[0078] In S911, it judges whether all the push switches SW2 are carrying out ON operation of the body side CPU 31. When all the push switches SW2 carry out ON operation, it progresses to S912, and when all the push switches SW2 do not carry out ON operation, it returns to S910.

[0079] In S912, the body side CPU 31 directs the Bure amendment halt to the lens side CPU 4. The body side CPU 31 transmits the Bure amendment stop signal to the lens side CPU 4 through signal-line SL2, in order to stop the Bure amendment operation. The lens side CPU 4 stops VCM 40 and 41 based on this Bure amendment stop signal.

[0080] In S913, the body side CPU 31 directs a centering operation start to the lens side CPU 4. The body side CPU 31 transmits a centering operation start signal to the lens side CPU 4 through signal-line SL2. The lens side CPU 4 carries out drive control of VCM 40 and 41 based on this centering operation start signal. It drives the lens frame 7 until the center O of VCM 40 and 41 of the Bure correcting lens 5 shown in drawing 8 corresponds with the optical axis I of the whole photography optical system.

[0081] In S914, the body side CPU 31 directs the Bure amendment start to the lens side CPU 4. the body side CPU 31 -- all push -- being working (photography -- working) -- an amendment Bure amendment start signal is transmitted for

Bure to the lens side CPU 4 through signal-line SL2 In the lens side CPU 4, based on this Bure amendment start signal, drive control of VCM 40 and 41 is carried out, and the Bure correcting lens 5 resumes the Bure amendment.
[0082] In S915, the body side CPU 31 directs exposure. The shutter section 36 and a converging section 37 operate, and exposure is started.
[0083] In S916, the body side CPU 31 directs the Bure amendment halt to the lens side CPU 4. The body side CPU 31 transmits the Bure amendment stop signal to the lens side CPU 4 through signal-line SL2. The lens side CPU 4 stops the drive of VCM 40 and 41 based on this Bure amendment stop signal.
[0084] In S917, the body side CPU 31 directs a lock to the lens side CPU 4. Since the Bure correcting lens 5 is locked, the body side CPU 31 transmits a lock start signal to the lens side CPU 4 through signal-line SL2.
[0085] In S918, the body side CPU 31 points to film winding to the film mechanical component 39, and winds up and carries out the return of the film which the film mechanical component 39 does not illustrate.
[0086] In S919, it judges whether the half-push switch SW1 is carrying out ON operation of the body side CPU 31. While the half-push switch SW1 is maintaining ON operation, it progresses to S920, and when the half-push switch SW1 has not carried out ON operation, it returns to S901.
[0087] In S920, it judges whether all the push switches SW2 are carrying out ON operation of the body side CPU 31. When all the push switches SW2 carry out ON operation, it progresses to S921, and when all the push switches SW2 do not carry out ON operation, it returns to S919.
[0088] In S921, the body side CPU 31 directs exposure. The shutter section 36 and a converging section 37 operate, and exposure is started.
[0089] In S922, the body side CPU 31 directs the Bure amendment halt to the lens side CPU 4. In the body side CPU 31, the Bure amendment stop signal is transmitted to the lens side CPU 4, and the lens side CPU 4 suspends drive control of VCM 40 and 41.
[0090] In S923, the body side CPU 31 directs a lock to the lens side CPU 4. Since the Bure correcting lens 5 is locked, the body side CPU 31 transmits a lock start signal to the lens side CPU 4, and returns to S901.
[0091] Below, operation of the locking device in the Bure compensator concerning the 1st operation gestalt of this invention is divided and explained to lock operation and lock release operation. Drawing 11 is a flow chart for explaining lock operation of the locking device in the Bure compensator concerning the 1st operation gestalt of this invention. Drawing 12 is a flow chart for explaining lock release operation of the locking device in the Bure compensator concerning the 1st operation gestalt of this invention.
[0092] (Lock release operation) In S1101, it judges whether the lock state pilot switch SW4 is carrying out ON operation of the lens side CPU 4. If the lock release start signal which the body side CPU 31 transmitted is received, as for the lens side CPU 4, the lock state pilot switch SW4 will judge whether ON operation is carried out. As shown in drawing 6 , when smooth side 93a fits into crevice 73a, the lock pin 93 locks this Bure correcting lens 5 in the center position whose center O of the Bure correcting lens 5 corresponds with an optical axis I. this state -- a spring receptacle -- a member -- 93c is carrying out ON operation of the lock state pilot switch SW4 While the lock state pilot switch SW4 is carrying out ON operation, it progresses to S1102, and a return is carried out when the lock state pilot switch SW4 has not carried out ON operation.
[0093] The lens side CPU 4 makes VCM 40 and 41 carry out center maintenance in S1102. The lens side CPU 4 carries out drive control of VCM 40 and 41, and VCM 40 and 41 holds the lens frame 7 in the center position whose center O of the Bure correcting lens 5 corresponds with an optical axis I.
[0094] The lens side CPU 4 makes the latch solenoid 90 attract plunger 90a in S1103. The lens side CPU 4 is directed to the power circuit which is not illustrated so that a power supply may be supplied to the latch solenoid 90. If this power circuit energizes for about 20 to 40ms to the latch solenoid 90, the latch solenoid 90 will resist the energization force of coiled spring 90b, and will attract plunger 90a.
[0095] In S1104, it judges whether the lock state pilot switch SW4 carried out ON operation of the lens side CPU 4. If plunger 90a retreats in the direction of A in drawing, since hook section 91c has started flange 90c, a lever 91 is counterclockwise rotated focusing on shaft 91a. Since 93d of flanges has cost 91d of hook sections, a lock pin 93 is interlocked with rotation of a lever 91, and they resist and move it to the energization force of coiled spring 92. consequently, it is shown in drawing 7 -- as -- smooth side 93a -- from crevice 73a -- escaping -- a spring receptacle -- a member 93 carries out OFF operation of the lock state pilot switch SW4 In order to attract and hold plunger 90a, the latch solenoid 90 maintains the state where it escaped from and came out of crevice 73a, as a lock pin 93 is shown in drawing 7 . Since the lock state of the Bure correcting lens 5 canceled when the lock state pilot switch SW4 carried out OFF operation, when it progresses to S1105 and the lock state pilot switch SW4 has not carried out OFF operation, it returns to S1102.
[0096] The lens side CPU 4 makes VCM 40 and 41 stop center maintenance in S1105. The lens side CPU 4 carries out

drive control of VCM 40 and 41, drives the Bure correcting lens 5 by VCM 40 and 41 in the direction which carries out an abbreviation rectangular cross to an optical axis I, and amends Bure.
[0097] (Lock operation) In S1201, it judges whether the lock state pilot switch SW4 is carrying out ON operation of the lens side CPU 4. If the lock start signal which the body side CPU 31 transmitted is received, as for the lens side CPU 4, the lock state pilot switch SW4 will judge whether ON operation is carried out. while the lock state pilot switch SW4 is carrying out ON operation, a return is carried out, and it is shown in drawing 7 -- as -- a spring receptacle -- a member -- when 93c has not carried out ON operation of the lock state pilot switch SW4, it progresses to S1202
[0098] In S1202, the lens side CPU 4 returns plunger 90a to the latch solenoid 90. The lens side CPU 4 directs supply of the power supply to the latch solenoid 90 to the power circuit which is not illustrated. if ********** energizes for about 20 to 40ms to the latch solenoid 90 -- plunger 90a -- the energization force of coiled spring 90b -- it returns If plunger 90a projects in the direction of A in drawing, a lever 91 will be clockwise rotated focusing on shaft 91a. A lock pin 93 is interlocked with rotation of a lever 91, and moves towards the smooth side 73 according to the energization force of coiled spring 92. As shown in drawing 8 , when the center O of the Bure correcting lens 5 has shifted to an optical axis I, the center of smooth side 93a is not in agreement with the center of crevice 73a. For this reason, smooth side 93a carries out pressurization contact with the smooth side 73 according to the energization force of coiled spring 92, without the ability fitting into crevice 73a. in addition -- this state -- a spring receptacle -- the member 93 has not carried out ON operation of the lock state pilot switch SW4
[0099] The lens side CPU 4 makes centering operation start in S1203. The lens side CPU 4 carries out drive control of VCM 40 and 41 based on the lock start signal which the body side CPU 31 transmitted. VCM 40 and 41 drives the lens frame 7 to the center position whose center O of the Bure correcting lens 5 corresponds with an optical axis I. Consequently, smooth side 93a slides this smooth side 73 top, maintaining the state where pressurization contact was carried out with the smooth side 73.
[0100] In S1204, it judges whether the lock state pilot switch SW4 is carrying out ON operation of the lens side CPU 4. When the center O of the Bure correcting lens 5 is in agreement with an optical axis I, crevice 73a is formed in the lens frame 7 so that smooth side 93a may fit in. For this reason, if VCM 40 and 41 drives the lens frame 7 until the center of crevice 73a is in agreement with the center of smooth side 93a, smooth side 93a will fit into crevice 73a. consequently, a spring receptacle -- ON operation of the lock state pilot switch SW4 is carried out by the member 93, and the Bure correcting lens 5 is locked by the lock pin 93 When the lock state pilot switch SW4 carries out ON operation, it progresses to S1205, and when the lock state pilot switch SW4 does not carry out ON operation, it returns to S1202.
[0101] In S1205, the lens side CPU 4 stops centering operation. The lens side CPU 4 suspends drive control of VCM 40 and 41 based on ON operation of the lock state pilot switch SW4.
[0102] The Bure compensator concerning the 1st operation gestalt of this invention has an effect which is indicated below.
(1) Although the 1st operation gestalt of this invention carries out pressurization contact of the smooth side 73 of the lens frame 7, and the smooth side 93a of a lock pin 93, the smooth side 73 and smooth side 93a are formed at the smooth flat surface in parallel to the driving direction of the Bure correcting lens 5. Moreover, smooth side 93a has come to fit into crevice 73a, when the center O of the Bure correcting lens 5 is in agreement with an optical axis I. For this reason, the smooth side 73 can be made to slide to smooth side 93a, where pressurization contact of the smooth side 73 and the smooth side 93a is carried out. Consequently, if the lens frame 7 is driven by VCM 40 and 41 until the center O of the Bure correcting lens 5 is in agreement with an optical axis I, the Bure correcting lens 5 can be easily locked by the lock pin 93. Moreover, since it can continue at the time of lock operation and energization of the latch solenoid 90 and VCM 40 and 41 can be performed, excessive power consumption can be held down.
[0103] (2) The 1st operation gestalt of this invention is equipped with the coiled spring 92 which generates sufficient energization force for the smooth side 73 and smooth side 93a to carry out pressurization contact. For example, when the point of a lock pin and the hole into which this point fits are formed in the shape of a taper and both center is not in agreement, it is necessary to insert the point of a lock pin in a hole compulsorily with the coiled spring which generates the excessive energization force. And a lens frame is driven in the direction which intersects perpendicularly with an optical axis, and it is necessary to lock the Bure correcting lens 5 by the point of a lock pin, until the center of this point and a hole is in agreement. Consequently, since a lens frame is driven, the coiled spring which generates the excessive energization force will be needed, and the latch solenoid which generates the force of opposing this energization force will be enlarged. The 1st operation gestalt of this invention of the latch solenoid 90 which generates the force of opposing this energization force since the energization force of coiled spring 92 becomes small has also been small enough, and power consumption can be mitigated. Moreover, since the stroke of plunger 90a becomes small, if the small latch solenoid 90 is installed in the Bure amendment unit, it is sufficient, and ** space-ization in a unit can be

attained.
[0104] (The 2nd operation gestalt) Drawing 13 is the cross section showing the locking device in the Bure compensator concerning the 2nd operation gestalt of this invention. Drawing 13 (A) is the cross section showing the state where the locking device locked the lens frame. Drawing 13 (B) is the cross section showing the state where the locking device carried out lock release of the lens frame. Drawing 13 (C) is the cross section showing the state where the smooth side of a locking device contacted the smooth side of a lens frame. Below, the same member as the member shown in drawing 6 - drawing 8 attaches the same number, and is explained, and detailed explanation is omitted.
[0105] The Bure compensators concerning the 2nd operation form of this invention are other operation forms which unlike the 1st operation form formed a lock pin 730 and smooth side 730a in the lens frame 7 side, and formed the smooth side 930 and crevice 930a in the lock-pin 93 side.
[0106] a lock pin 730 is formed in the front face of the lens frame 7 -- having -- a spring receptacle -- a member -- the 93c side -- projection -- they are heights the bottom The lock pin 730 equips the point with smooth side 730a.
[0107] Smooth side 730a is a portion which enables pressurization contact of the slide to the smooth side 930 of a lock pin 93. Smooth side 730a is a flat surface which carries out an abbreviation rectangular cross to an optical axis I.
[0108] The smooth side 930 is a portion which carries out pressurization contact with this smooth side 730a so that smooth side 730a of a lock pin 730 can be slid. The smooth side 930 is being fixed to the point of a lock pin 93. The smooth side 930 is equipped with smooth side 730a and crevice 930a which can be fitted in in the center of abbreviation. It can move in the direction parallel to an optical axis I, and the smooth side 930 can be interlocked with operation of plunger 90a, and can move freely to the lens frame 7. The smooth side 930 is formed in parallel with smooth side 730a, and it is formed in the abbreviation perpendicular to the optical axis I so that it may become parallel to the driving direction of the Bure correcting lens 5 and the lens frame 7.
[0109] Crevice 930a is a portion for smooth side 730a of a lock pin 930 fitting in, and locking the lens frame 7. As shown in drawing 13 (B), crevice 930a slips out of smooth side 730a, and cancels the lock of the lens frame 7, while it locks the lens frame 7 by inserting in smooth side 730a of a lock pin 730, as shown in drawing 13 (A). crevice 930a -- smooth side 730a -- inserting in -- ****** -- easy -- as -- the cross-section configuration -- the cross-section configuration of smooth side 730a, and abbreviation -- it is desirable to make it the same Crevice 930a and smooth side 730a have a desirable configuration which is parallel to these center lines, as shown in drawing 13 .
[0110] The Bure compensator concerning the 2nd operation gestalt of this invention has the effect of the 1st operation gestalt, and the same effect.
[0111] (others -- operation gestalt) various deformation or change are possible so that this invention may not be limited to the operation gestalt explained above and it may indicate below, and it is within the limits with this invention equal [these]
(1) Although the operation gestalt of this invention is transmitting the drive of plunger 90a to the lock pin 93 through a lever 91 etc., it may omit a lever 91, and may direct-lock and lock cancel the lens frame 7 by plunger 90a.
[0112] (2) Although the operation form of this invention is energizing the latch solenoid 90 after holding the Bure correcting lens 5 by VCM 40 and 41 in a center position, it can also cancel the lock of the Bure correcting lens 5 only by energization of the latch solenoid 90.
[0113] (3) Although the operation form of this invention arranges VCM40 and VCM41 so that the direction of electromagnetic force Py and Px may cross mutually right-angled, they may be 90 abbreviation or the other angle for convenience' sake [design] etc. Moreover, although the guide shaft 9 is arranged so that it may cross by 45 abbreviation to a x axis and the y-axis, it is not limited to this. Furthermore, you may install VCM 40 and 41 in two or more lens frames 7.
[0114] (4) Although the operation gestalt of this invention gave and explained to the interchangeable lens 20 of a single-lens reflex camera the example which carried the Bure compensator, it can apply this invention also about the case where the Bure compensator is carried in the camera body 30, a middle adapter, and a lens one apparatus camera. Moreover, this invention cannot be limited to a still camera and can be applied also about optical instruments, such as photography equipments, such as a digital camera and a video camera, a binocular, and a telescope.
[0115]
[Effect of the Invention] According to this invention, a driving force generator can drive the Bure amendment optical system, after the engagement section of a holddown member and the slide section of the attachment component holding the Bure amendment optical system have carried out pressurization contact, and it can make the engagement section of a holddown member, and the engaged section of an attachment component engaged as explained in detail above. Therefore, while being able to hold down the power consumption of the whole equipment, miniaturization of the whole equipment can be attained.

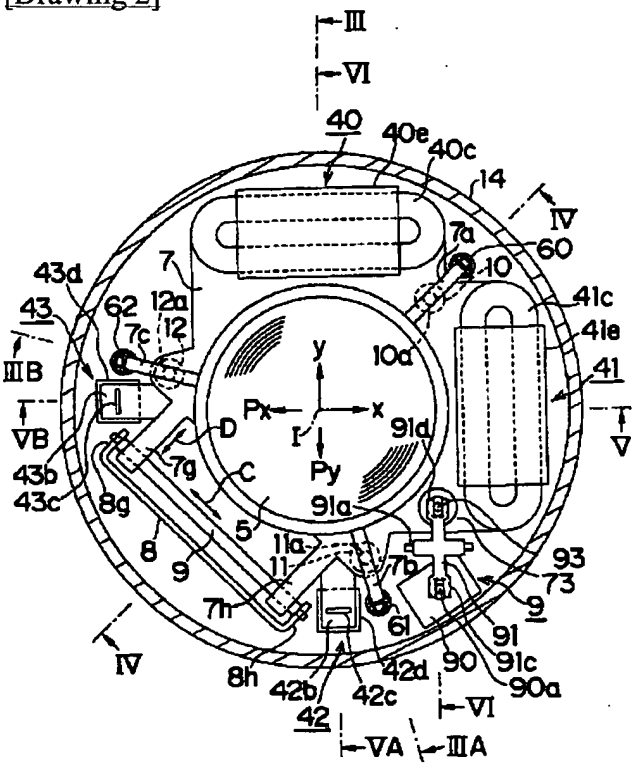
[Translation done.]

* NOTICES *

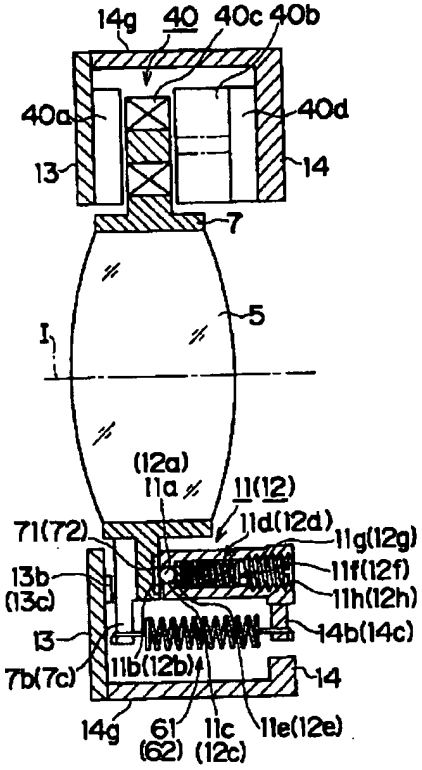
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

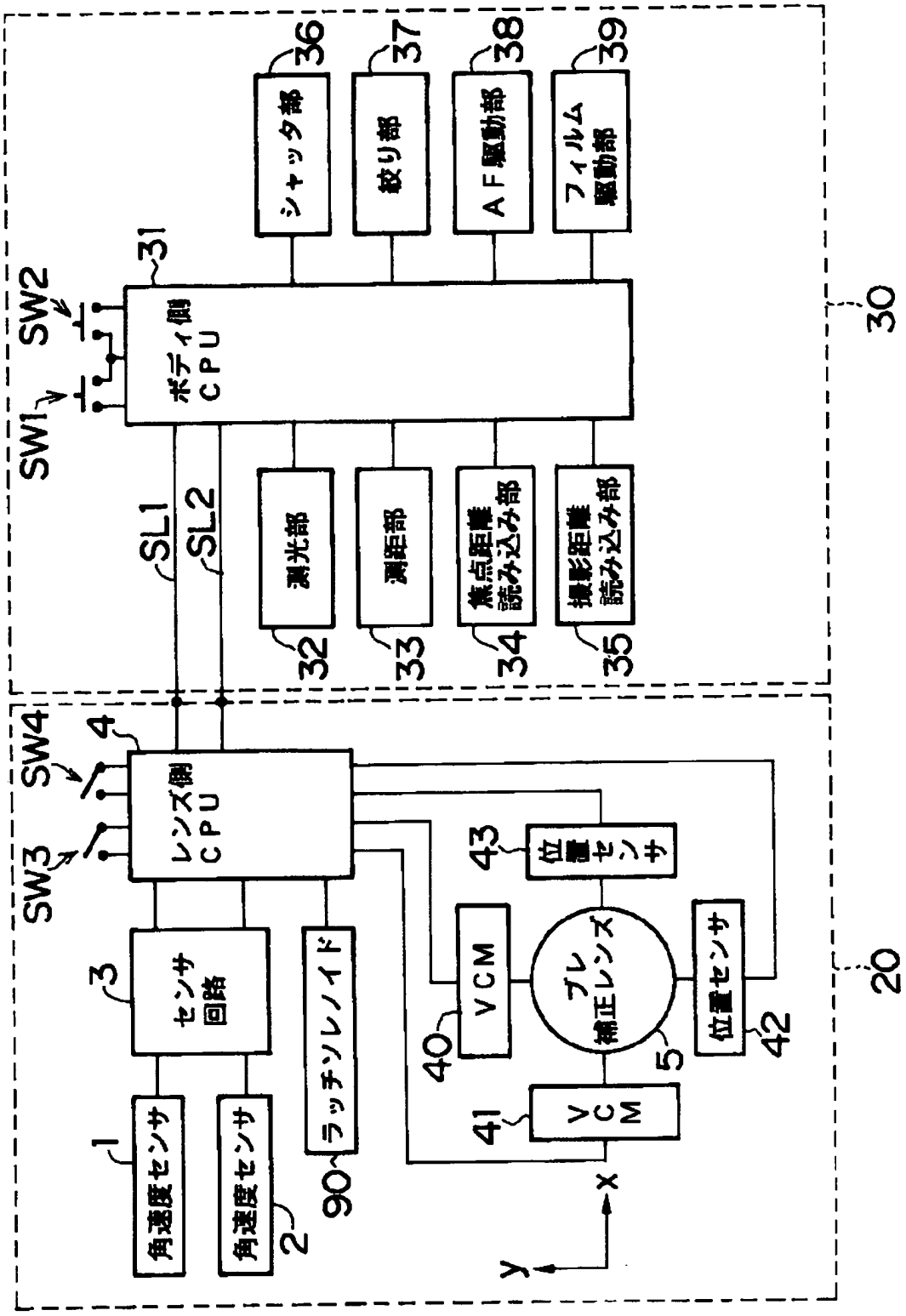
[Drawing 2]



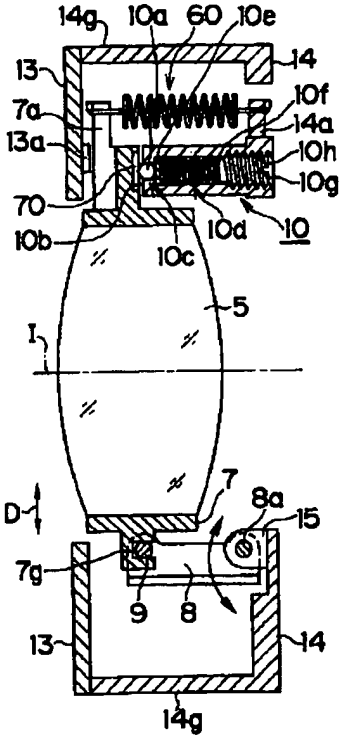
[Drawing 3]


14g
40
40c
40b
40a
40d
13
14
7
5
I
(12a)
11a
11(12)
11d(12d)
71(72)
11g(12g)
13b
(13c)
11f(12f)
11h(12h)
13
14b(14c)
7b(7c)
11b(12b)
14
14g
61
(62)
11c
(12c)
11e(12e)

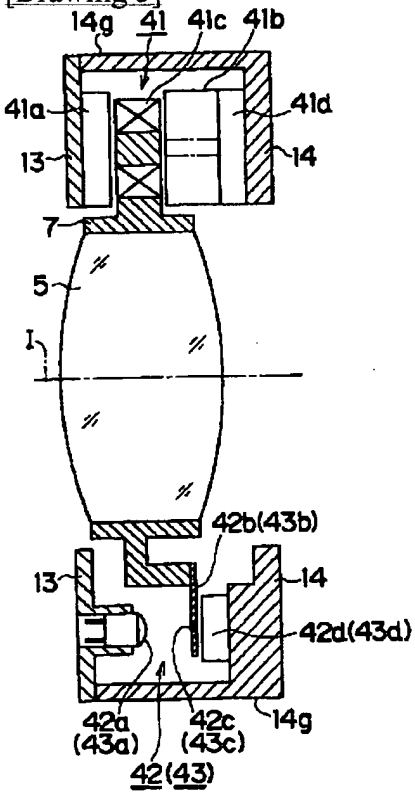
[Drawing 1]


シャッタ部
絞り部
AF駆動部
フィルム駆動部
36
37
38
39
31
SW2
SW1
ボディ側CPU
30
SL1
SL2
測光部
測距部
焦点距離読み込み部
撮影距離読み込み部
32
33
34
35
SW4
SW3
4
レンズ側CPU
センサ回路
3
ラッチソレノイド
90
角速度センサ
1
角速度センサ
2
VCM
40
ブレ補正レンズ
5
位置センサ
43
位置センサ
42
VCM
41
X
Y
20

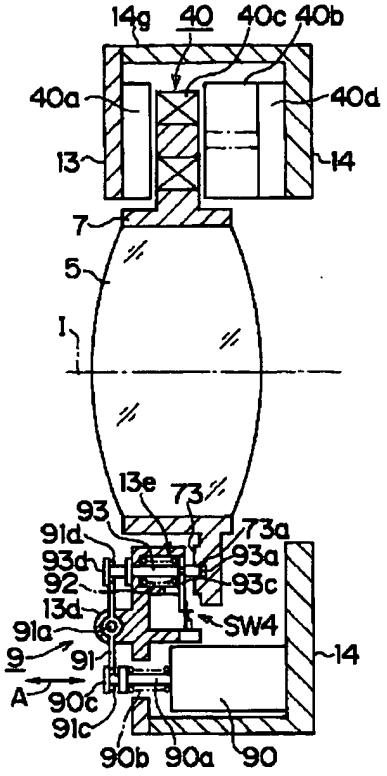
[Drawing 4]



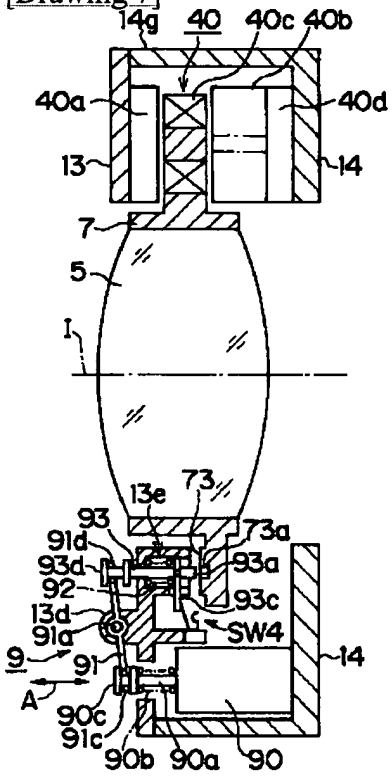
[Drawing 5]



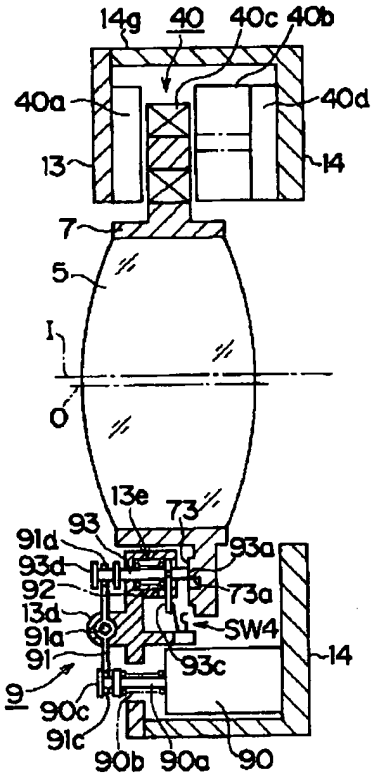
[Drawing 6]



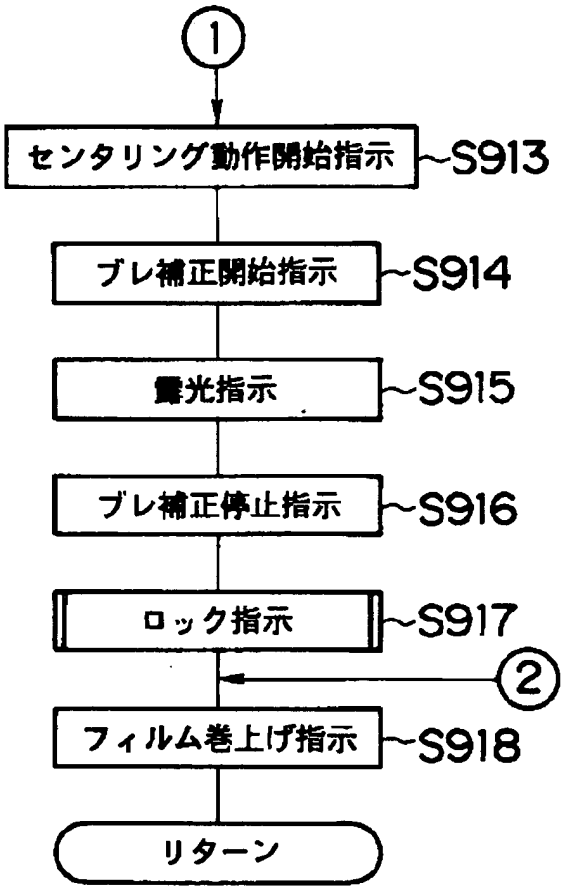
[Drawing 7]



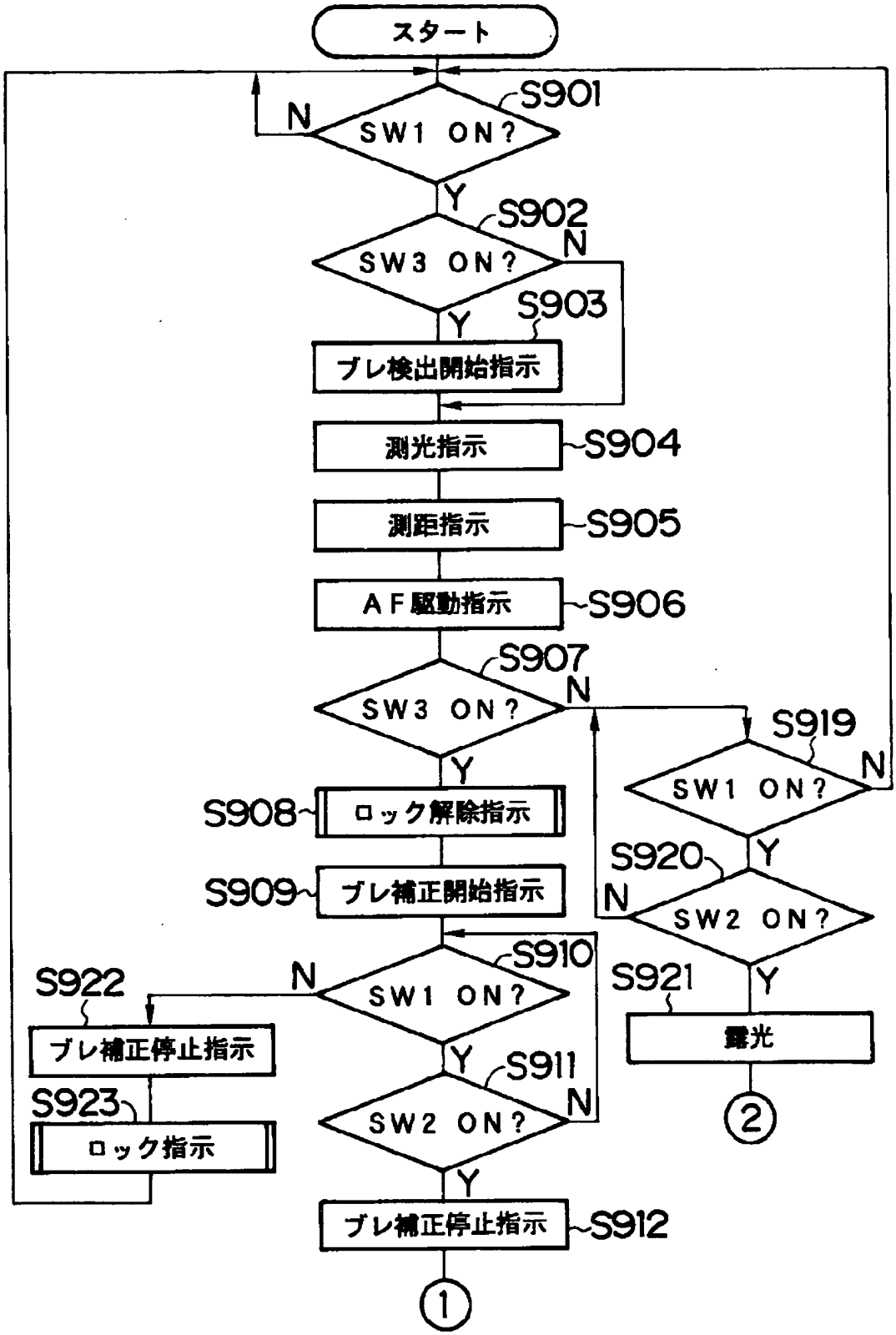
[Drawing 8]



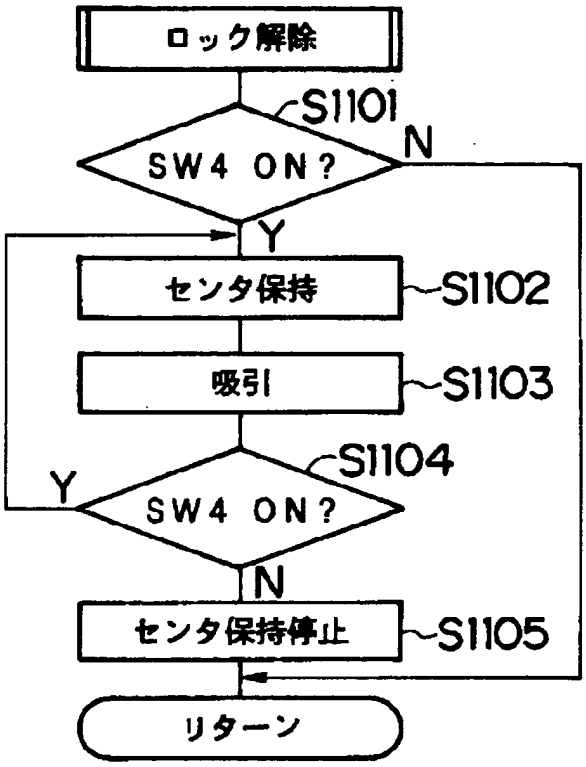
[Drawing 10]



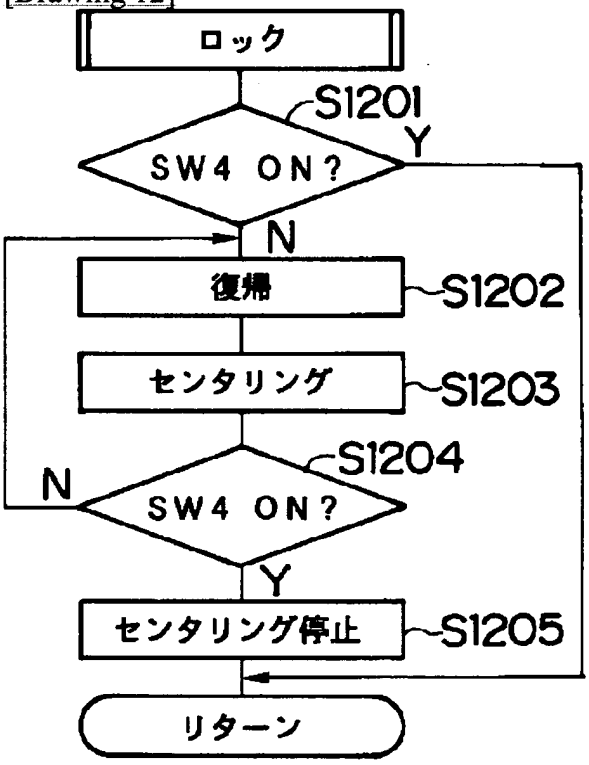
[Drawing 9]


スタート
S901
SW1 ON?
N
Y
S902
SW3 ON?
N
Y
S903
ブレ検出開始指示
測光指示
S904
測距指示
S905
AF駆動指示
S906
S907
SW3 ON?
N
Y
S908
ロック解除指示
S909
ブレ補正開始指示
S910
SW1 ON?
N
Y
S911
SW2 ON?
N
Y
ブレ補正停止指示
S912
①
S919
SW1 ON?
N
Y
S920
SW2 ON?
N
Y
S921
露光
②
S922
ブレ補正停止指示
S923
ロック指示

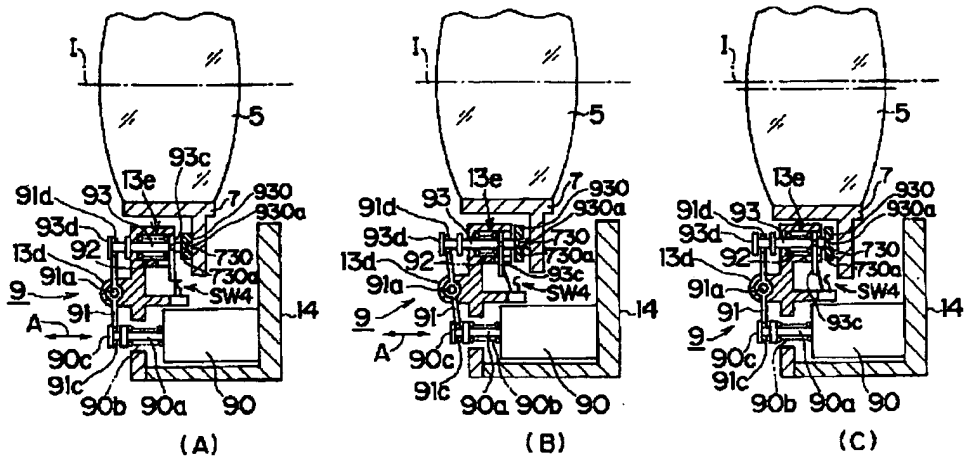
[Drawing 11]



[Drawing 12]



[Drawing 13]



[Translation done.]